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Executive Office of Environmental Affairs
Commonwealth of Massachusetts

Toxics Use Reduction Case Study

VOC AND FREON REDUCTION AT GALILEO ELECTRO-OPTICS CORPORATION

SUMMARY

Galileo Electro-Optics Corporation of Sturbridge, MA, implemented chemical substitution in its production and quality inspection areas to reduce volatile organic compound (VOC) emissions. The changes, which cost less than \$1000, have reduced trichloroethylene (TCE) purchases, usage and emissions in the production operation by more than 95%. A Galileo-designed reclamation system recycles freon in-process. This has reduced freon purchases by 72% and cut emissions by nearly 60% from 1988 levels. In quality inspections, the annual use and emission of 560 lbs. of freon has been eliminated, saving the firm \$2,700 each year.

BACKGROUND

The Galileo Electro-Optics Corporation, which employs 250 people, manufactures fiber optic plates. In the typical production sequence, plates are mounted to fixtures using wax prior to cutting, polishing or grinding. TCE was then used to remove the wax.

In a quality control inspection operation, a freon-based aerosol was used to blow dust and debris off the part. (It is necessary to thoroughly remove the contaminants in order to obtain accuracy in inspection.)

As part of the manufacturing process, glass fibers are placed in molds to form fused blocks of fibers. These blocks act to transfer images with a high degree of clarity, such as in photocopier machines. Prior to molding, the fibers are cleaned in a two-part vapor degreaser which uses freon. First, a freon-based soap solution washes the fibers. Following the wash, the fibers are rinsed in a freon-based solvent, then dried and assembled into the molds. It is vital that the fibers be free of contamination, which creates cracks in the fibers, spoiling the resolution of the image. Also, the cleaning solvent itself must readily evaporate from the fibers; otherwise, the blocks explode when subjected to high temperatures in a further processing step. Currently, only freon meets the evaporation and cleaning needs of Galileo.

TOXICS USE REDUCTION PLANNING

After attending seminars given by OTA and DEP on toxics use reduction, Galileo formed a Toxics Use Reduction Task Force to investigate the potential for removing highly toxic chemicals from the work area. In addition to purchase and disposal costs, the use of such chemicals impacts on the cost of ventilation needed to insure worker safety.

As part of the planning process, all employees were requested to submit ideas and suggestions to the task force. These ideas were incorporated into reduction plans submitted by the task force. Vendors were consulted concerning waxes and alloys which could be removed without the use of TCE. Galileo's long-term plan is to eliminate freon use in cleaning. In the meantime, Galileo is focusing on eliminating the cleaning steps in the manufacture of their product. Parts will be manufactured clean rather than cleaned after being made.